Business Markups

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When I was a boy, I worked in my father's boat store. I remember a discussion with my dad once about how the cost of a boat needs to be marked up an amount larger than the profit you wanted to make. When I asked my dad about it, he just referred me to a table that businessmen used (i.e., he wouldn't explain it).

Here's an example. Suppose you are a businessman and you buy an item for $2. You want to make a profit of 30% on the item. What should the selling price be?

The naive approach would be to just add 30% to the cost, but that's clearly wrong. The reason is that profit is always calculated on the selling price, but markup is calculated on the cost. Thus, you're doing percentages with different bases.

In later years, I worked out the formula for this because I wondered where the table came from. It's not hard to derive and is so fundamental to buying and selling, I'll give the derivation here. You may be surprised to see it's just simple algebra that you learned in your freshman year of high school.

Let's use the following symbols:

C = cost of an item
S = selling price of an item
P = profit, usually given as a fraction of the selling price
M = markup, usually given as a fraction of the cost

With these definitions, we have the two fundamental equations (really, they're just the definitions of these quantities)

$$S = C(1+M) \tag{1}$$

$$C = S(1-P) \tag{2}$$

What we want is the relationship between M and P. To get this, substitute the expression for S from equation (1) into equation (2)

$$C = C(1+M)(1-P)$$

The C's cancel out from each side to yield

$$\begin{aligned} 1 &= (1+M)(1-P) \\ 1 &= (1+M) - P(1+M) \\ -M &= -P(1+M) \\ P &= \frac{M}{1+M} = \frac{1}{1+\frac{1}{M}} \end{aligned}$$

where I have written each step out to make it easier to follow (if you're confused by the last step, I just divided both the numerator and denominator by M). Since we know neither P nor $1+\frac{1}{M}$ will be zero, we can take the inverse of each side to get

$$\frac{1}{P} = 1+\frac{1}{M} \qquad \text{or} \qquad P = \frac{M}{1+M} \tag{3}$$

This is the fundamental equation relating profit P based on selling price and markup M based on cost. I suggest you memorize either of these equations.

If you solve equation (3) for M in terms of P, you'll have

$$\frac{1}{M} = \frac{1}{P} - 1 \qquad \text{or} \qquad M = \frac{P}{1-P} \tag{4}$$

Let's look at some examples. Suppose we want 25% profit on selling price. This means $P = 0.25 = \frac{1}{4}$. Putting that in equation (4), we get M = 1/3 or 33%.

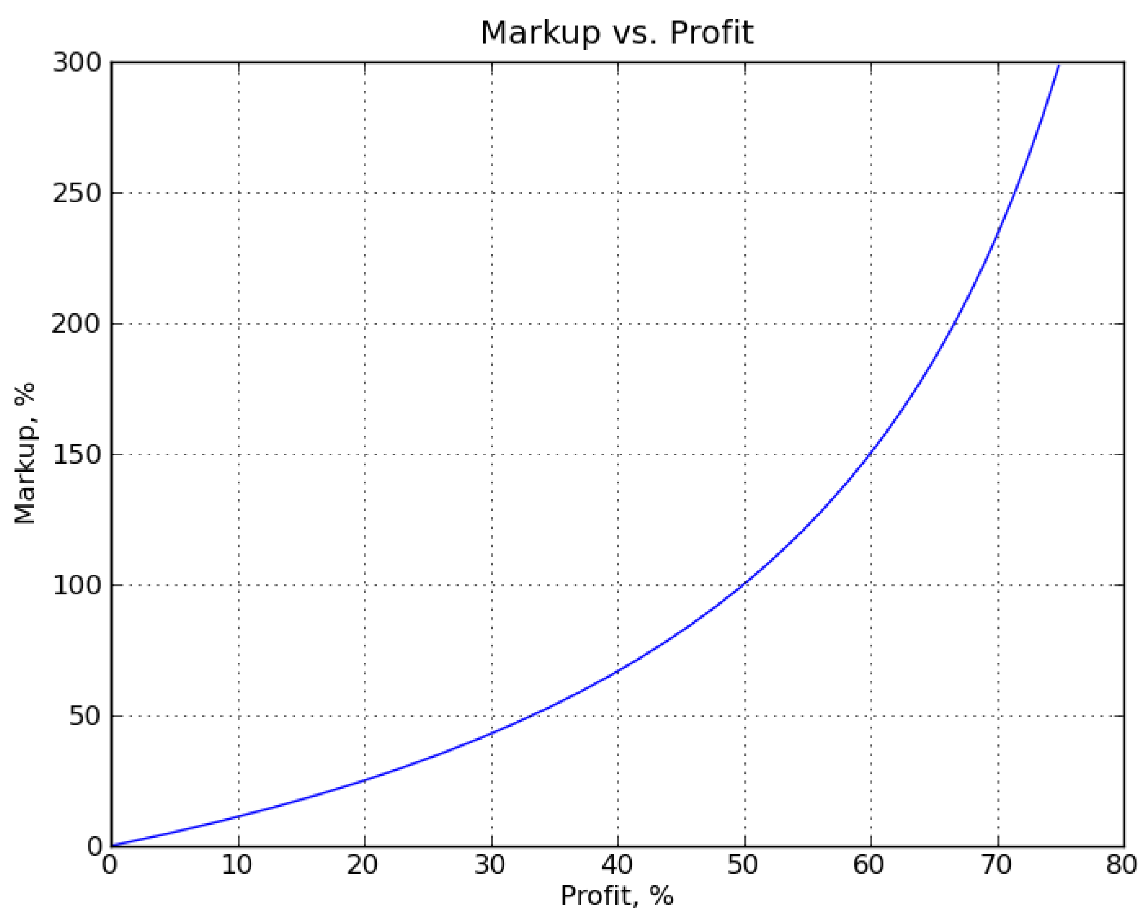
Check that result with a real example. Suppose I buy an item for $6. I thus need to add 1/3 of this to the cost to get the selling price to make 25% profit. Thus, the selling price is $8 and the profit is $2, which is 25% of the selling price. Yep, it works.

Suppose we want 100% profit. Putting that in equation (4) yields $\frac{1}{M} = 0$. Thus, we'd have to make the markup infinitely large to make everything profit, so that gives a sensible bound.

My father's business used tables for this, but I've seen various tools over the years for it. One popular one was a circular slide rule where you set the profit you wanted against the cost and read off the selling price.

But now that you know the formula and you'll often have a calculator handy, there's no need for any other tools. See, that algebra you slept through is occasionally useful! ☺

Here's a plot of the relationship:



Multipliers

At a company I used to work at, it was common to talk about the multiplier of a product, as this quickly gave one a feel for the success of product development's and marketing's efforts in bringing the product to market. This was a number m where

$$m = \frac{S}{C}$$

In other words, it was the ratio of selling price to cost. Preferred products had large multipliers; sometimes they could be 5 or higher; I remember one product had a multiplier of nearly 50!

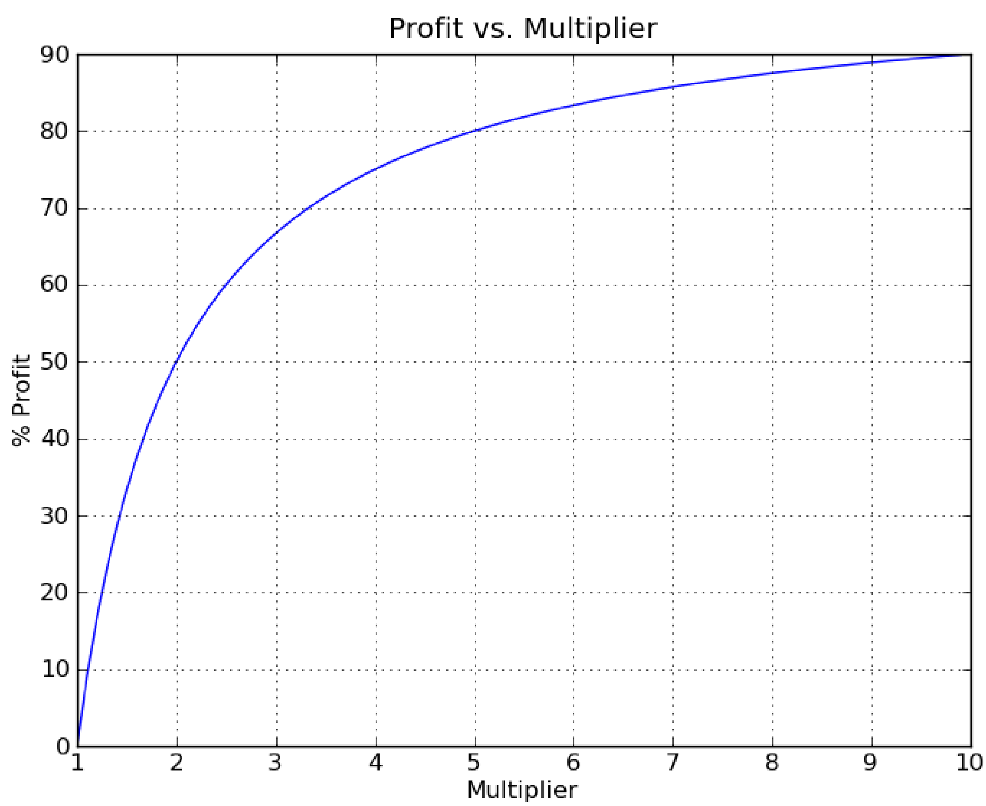
We can quickly derive what the profit P is given this definition of m by substituting $S = mC$ in equation (2); the result is

$$\boldsymbol{P = 1 - \frac{1}{m}}$$

and

$$\boldsymbol{m = \frac{1}{1 - P}}$$

If you use multipliers, this could be worth memorizing. You can see that you approach 100% profit as m grows without bound. Here's a plot that shows the behavior:



Many retail outlets have to work with profits on the order of 1/3 (or less) to be competitive and survive. You can see that their multiplier at this level is 1.5 (and, you can immediately see that means a markup of 50%). That product with a multiplier of 50 had a profit of 98%. Of course, before you get the idea that this was a gouging operation, you need to realize that the reported cost was a manufacturing cost and didn't include the cost of product development, research, and licensing fees (and these costs were significant for this family of products).

I would assume the majority of retail outlets that have significant competition operate in the multiplier range of 1 to 2. It's very nice when you have a unique product or where it's protected by patents, as you can use significantly higher multipliers.